

Regular Research Article

Mysterious ginger: Enclaves of a boom crop in Thailand

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Abstract: Ginger (*Zingiber officinale*) is a perennial herb revered as one of the most popular and valued spices of the world. Ginger is the main cash crop supporting the livelihood and improving the economic level of many ginger growers of India, Indonesia, Nigeria and Bangladesh. Although Thailand was the fifth highest ginger producing country in the world, documentation and general recorded information on ginger cultivation, both for domestic production and export value trade, is very limited. The ginger production system is also confounding. Moreover, ginger in Thailand has received little attention from researchers. There is no research or publications about Thai production of ginger and ginger farmers in both Thai and English publications. This paper is an initial attempt to establish a ginger story in Thailand by using the Plaba sub-district in Loei province as a case study to document this overlooked story and bring attention from researchers or government officials who are interested in the possibility of identifying new agriculture possibilities and recognize potential crops for further development to support rural livelihoods.

Keywords: high value crop; land use; mountain agriculture

1. Introduction

Ginger (*Zingiber officinale*) is a perennial herb revered as one of the most popular and valued spices of the world. It is native to the tropical rainforests of Asia. The most useful part of this plant is the underground rhizome. It is widely used for culinary and medicinal purpose, including food seasoning, candy, and ginger wine (Sawa, 2017). Ginger is also used to treat nausea, vomiting, indigestion, fever and infection and to promote vitality and longevity (Singh and Singh-Dhillon 2015).

Ginger is cultivated in more than 30 countries over the world. In 2014, the global planted area of ginger was 396,724 ha with the production of 2,156,453 tons (FAOSTAT, 2017). India was the top producing country accounting for 17% of total global production and China was second, accounting for 12%. Ginger is generally sold in its raw form in local markets but there are several other products, including dry ginger, ginger powder, ginger oil and oleoresin for the international market. The five leading non-crushed and non-ground ginger exporting countries in 2016 were China with US\$337.3 million (58.7% of total non-crushed and non-ground ginger exports), Netherlands (12%), Nigeria (4.9%) and Thailand (4.7%) (Workman, 2017).

Thailand was fifth highest ginger producing country in the world amounting to 135,514 tons, and accounting for about 6.28% of the world's total ginger production in 2014. Thailand was also the fourth leading ginger exporting countries in the world with a value of US\$ 27.2 million and accounting for about 4.7% of non-crushed and non-ground ginger exporting countries in 2016. In Thailand, ginger is mainly grown in some mountainous districts in Petchabun, Loei, Chiang Rai and Pha Yao provinces (Lakchaikoon, nd). The most recent available data, found in 2011, shows that ginger covered about 15,241 rai¹ and there were 8,145 growers. These figures amount to a very small proportion compared to total agricultural land (114.6 million rai) and total number of

¹ 1 ha = 6.25 rai

farmers in the country (5.9 million farmers) (Agricultural Statistics Group, 2013). Productivity of ginger in Thailand is around 2,000 - 3,000 kg/rai which is much more than the average productivity in the world (400 kg/rai). The United States has the highest productivity (8300 kg/rai) of ginger in the world (Singh and Singh Dhillon, 2015). Records of Loei Provincial Agricultural Extension Office during 2007 to 2013 show that farm gate ginger prices fluctuated dramatically. For example, prices were 6 Baht²/kg in 2009, but in the next year (2010) had increased to 25.48 Baht/kg, and in 2012 dropped to 4 Baht/kg.

This paper began as a result of a short initial visit to a village in Phu Ruea district, Loei province of Thailand, where I discovered a village had continuously grown ginger for more than 30 years. Everyone in Plaba village grows ginger, and yet the surrounding areas do not. My conversations with ginger growers in this village reveals that ginger is the most valuable crop in the area. In late 1980s, the ginger was first planted in the village by Hmong people who migrated 160 km from Khao Kho district in Petchabun province to Phu Ruea district. About 30 years ago, Hmong began to rent the land in the village to grow ginger. They did this for a few years and then migrated to other areas to acquire new lands for growing ginger. After the Hmong left, the villagers also began to farm ginger that had been left behind by the Hmong. Transplanting the ginger to their lands, they discovered that ginger could be 100 times more profitable than maize. Maize in this area had been a low value field crop continuously grown for more than 50 years. These changes began to transform the landscape.

Ginger prices have always been unstable and cultivation poses difficulties as it is sensitive to disease. Once ginger is infected, the farmers will not get any yield for that year. However, for those still willing to take the risk, in a very good year they can earn windfall profits. Such high profits are used to purchase a car and tractor, generally bought in cash within a given year; while in other cases farmers boast being able to buy both a car and build a new house in just one year. All farmers proudly expressed that their wealth is because of ginger (large homes, cars, and tractors). They all revere ginger and its power to boost incomes. It is a king crop for them. In contrast with other agricultural extension programs however, this romantic boom story about ginger in this village has nothing to do with the government. There was no project or plan to develop ginger farming from government. A farmer told me that the government does not have any policy or development plan to include ginger or support its local farmers. In fact, the government actively discourages ginger cultivation because they believe it destroys the forest.

Therefore, I have tried to examine this unique village and their successful ginger ventures in this paper. I try to understand how Phu Ruea became an enclave of ginger cultivation. Ginger has long been vastly cultivated in Plaba sub-district of Phu Ruea, but why has it not been introduced in any of the neighboring sub-districts? In short, I try to explain how and why this mystery crop emerged. In order to answer these questions, I began by reviewing literature on ginger production in Thailand. Although Thailand was the fifth highest ginger producing country in the world, documentation and general recorded information on ginger cultivation, both for domestic production and export value trade, is very limited. The ginger production system is also confounding. Moreover, ginger has received little attention from researchers. Most of research about ginger were focused on the study of taxonomy, molecular, and diversity (e.g. Triboun, 2006; Sertwasana, 2008; Wongsuwan, 2010). There is no research or publications about production of ginger and ginger farmers in both Thai and English publications. Thus, this paper is an initial attempt to establish a ginger story in Thailand by using the Plaba sub-district case study to document this overlooked story and bring attention from researchers or government officials who are interested in the possibility or responsible for agricultural development, to recognize this potential crop and help to seek ways for further development. Information in this paper are based on a reconnaissance survey and semi-structured interviews with ginger growers and agricultural extension officers undertaken in ginger growing areas of Plaba subdistrict, Phu Ruea district, Loei province in December 2016. Secondary information comes from government databases, previous

² 1 US\$ = 34 Baht in June 2017

reports, research, published articles, and some online news (as relevant) were also reviewed for supplementary information.

This paper is divided into four parts. First I provide some literature reviews related to ginger cultivation. Secondly, I examine the physical, social and economic characteristics of Plaba sub-district in order to explain how ginger took root in this particular area. Third, I provide a history of ginger cultivation in the study area related to the Hmong growers that initially brought the crop to the area. Finally, I provide a description of the ginger production system in Phu Ruea, Indonesia.

2. Literature reviews related to ginger cultivation

Available research related to relatively similar ginger production systems have been conducted in India (Rahman et al., 2009; Muenster, 2015), Ethiopia (Geta and Kific, 2011), Nepal (Micro-Enterprise Development Program, 2013) and Nigeria (Nandi et al., 2011; Makarau et al. 2013; Ezra et al., 2017), where ginger is an important commercial crop. Singh and Singh Dhillon (2015) analyzed economic returns of ginger crops in Sirmour district of Himachal Pradesh, India, and found that income measured were found to be positive. Cost and benefit ratio of ginger crop was about 2 which means ginger crop was very profitable for farmers. In the South Indian district of Wayanad, Some farmers blamed ginger as a killer because it causes some cultivators to lose their money and in some cases, it drives farmers to suicide. However, others also labeled the crop "ginger king" because some farmers and rural entrepreneurs have become millionaires in just a few years of cultivating ginger. Ginger is also known as a gamble because returns are unpredictable. The cultivators will be rich or will be ruined (Muenster, 2015).

Ginger prefers well-drained soils like sandy or clay loam, red loam or laterite loam. Muenster (2015) indicates that ginger is most suitable for recently cleared forest soil. Yadav et al., (2004: citing Gosh, 1984) also indicates that ginger is an exhaustive crop by nature and, therefore does not advise cultivation in the same field year after year. In the Northeast region of India, ginger is rotated with French bean or soybean, which not only improve the physical condition of the soil but also provides additional income to farmers (Yadav et al., 2004). The traditional systems of ginger cultivation in the Northeastern Region of India is called the *jhum* system, incorporated as part of shifting cultivation. The system involves clearing a patch of forest land which is usually done by burning, but retaining useful trees and plant varieties, cultivating gingers for two or three years and then abandoning it for 10-20 years to allow the natural forest to grow back and the soil to regain its fertility. However, with increasing populations, pressure on land has increased and the time-period for this cycle has shortened to around 3-5 years, which does not allow the same recovery time for the soil to regain its fertility. This has taken place as part of large scale deforestation taking place in the region, accompanied by soil degradation and depletion of the resource base (Yadav et al., 2004; Rahman et al., 2009).

Constraints of the production and marketing of ginger in India, Nigeria and Ethiopia are similar. Ginger is mainly constrained by input such as supply of fertilizer and varieties which is both insufficient and low quality, lack of source of credit, high cost of labor and high cost of transportation for marketing (Geta and Kifle, 2011; Singh and Singh Dhillon, 2015; Ezra et al., 2017).

3. Physical, social and economic characteristics of Plaba sub-district

Plaba is a sub-district in Phu Ruea district, Loei province in the Northeastern region of Thailand. The sub-district covers about 9,499 hectares located in the mountainous area with elevation about 800-900 meters above mean sea level. These are the highest place that people live in the Northeast. Climatically, the rainy season occurs from May through October and there is a prolonged dry season during the remainder of the year. Average annual rainfall is about 1,428 mm. Average minimum temperature is 11.5 °C in December and average maximum temperature is 34.5 °C in April (Agricultural Technology Transfer and Service Center, 2013) There were 3,466 inhabitants with a population density of 36 people/km² in 2016 (Department of Provincial

Administration, 2016). Ethnically, they are called Tai Loei. The Tai Loei speak the Lao Isan dialect of the Thai Language, which is similar to other Northeastern lowlanders. Moreover, many cultural patterns and agricultural practices are also similar with other nearby lowland areas, which contrasts with mountain communities in the North whom are ethnically and culturally much different from the northern lowland (Choenkwan et al, 2014).

More than 90% of Plaba people are engaging in agriculture with average landholdings at about 15 rai, but range from 3 to 50 rai. Average labor is about 2-3 people per household. This sub-district is surrounded by forests. About 90% of total sub-district's area is under protected area (Office of Soil Resources Survey and Research, 2008). Land titles of those agricultural land in the sub-district is Por.Bor.Tor 5 which is evidence showing that the occupier of a plot of land has been issued a tax number and has paid taxes for using the benefit of the land. This confers no ownership rights but was formerly used to establish that the holder was occupying a plot of land (Thailand law online, 2016).

Because of suitable environments for agriculture, there are various crops grown in this sub-district including rice (both upland rice and wet rice), maize, cassava, black-eyed peas, ginger, dragon fruit, pineapple, longan, lychee, banana, pineapple and rubber. However, the majority of land is used for growing field crops, especially maize. Generally, the farmers have more than one plot of land. They usually diversify crops into different land holdings. Rice are mostly grown for household consumption whereas other crops are grown for cash income. They also diversify cash crops to avoid risk of crop failure or low prices. In cases that one crop fails, they still have other reserves. Another reason is that each crop has different timing for production and harvest. In such systems they can earn income throughout the year from different crops and one crop can be used to invest in another crop.

Table 1. Calendar of agricultural activities in Plaba sub-district

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yield* (Kg/rai)	Price* (B/kg)	Value* (B/rai)
Wet rice													545	15.5	8447
Upland rice													415	17.7	7,345
Maize													679	5.5	3,734
Black eyed bean													287	21.5	6,170
Ginger													2,580	6.7	17,285
Banana													1,850	9.7	17,945
Dragon fruit													1,790	9.9	17,721
Longan													686	15	10,290

*Source: Loei Provincial Agricultural Extension Office (2013)

4. History of ginger cultivation in Praba sub-district and the Hmong

Ginger cultivation in Plaba sub-district began 30 years ago. Initially, it was grown by Hmong, a hill tribe living in Khoa Kho, a mountainous district in Petchabun province about 160 kilometers from Phu Ruea district. The Hmong came to the sub-district to rent lands for growing ginger. However, given that ginger cannot grow over repeated cultivation on the same land, the Hmong stay in the area for a few years and then move to other areas to find new land. Plaba farmers noticed the Hmong received high income for ginger and learned how to grow ginger from them. One farmer noted that the most attractive aspects of ginger was that it only uses a small area but can produced several tons. Although the price of ginger was low at the time, the value was still

much higher than maize or other field crops. After the Hmong left the area, ginger has been widely grown in Plaba sub-district ever since.

The Hmong are a hill tribe living in the high mountainous lands, mostly in the northern part of Thailand. Hmong ginger growers are in Kheknoi sub-district, Khao Kho district, Petchabun province located in the central part of Thailand with an elevation of about 800 meters above mean sea level. Kheknoi has been established as a community by the Thai army since 1971 for political reason (Sanyakul, 2004). However, the Hmong have been living there since at least 1922 (Xiong, 2015). Historically, this group of Hmong originally lived in the northern part of Thailand. They migrated from Nan province through the high mountain ranges, continuously settling new areas but remaining linked to the northern regions. They settled in this area because the climate is cooler, suitable for their lifestyle, and advantageous for growing opium (Xiong, 2015).

Sanyakul (2004) studied the economic and cultural development of Hmong in Kheknoi and reveals that during the 1960s, the Thai government was fighting the Communist Party of Thailand (CPT). Members of CPT escaped from the Thai government and fled into forest areas all over the country including Khao Kho district where the Hmong live. At that time, Khao Kho district was still contained by dense forests. The Thai army came to the area to fight the CPT. A large battle ensued between the army and CPT. As a result, the Hmong community were overcome and driven out. Most of the Hmong had supported the CPT and fought against the army. Some Hmong members however, supported the army and others migrated to other areas. Four years later, fighting between CPT and the Thai army had not ended. The Thai army enlisted male Hmong between the ages 18-25 years old to be a part of the army. These men were trained to be soldiers to fight the CPT, and they were called the Khao Kho volunteer soldiers. Finally, the army seized control of the area. The army allowed the volunteer soldiers to bring their families who migrated to other areas back to live with them. Many groups of Hmong migrated to the area and built a large Hmong community there. However, the area was still controlled by the army and the Hmong still lived in fear because the fighting had not completely ended. The CPT hid in the surrounding forest. In 1971, the Thai army asked the Royal Forestry Department for 20,000 rai of degraded forest land for these Hmong to live which it was a reason for security of the country. Most of the trees in these degraded forest had been cleared during the fighting with CPT in order to destroy places where CPT hidden in the forest (Xiong, 2015). Kheknoi was officially established as a village in 1975.

Hmong livelihoods were mainly driven by agricultural production systems. The traditional agricultural systems of the Hmong were a complex process of shifting cultivation driven by two main crops, namely rice for household consumption and opium for cash income. However, due to the restrictions of agricultural land and forest areas – some were under protected area status and other areas were seized and controlled by the CPT – the Hmong were restricted from practicing their traditional agricultural system of shifting cultivation. Moreover, they could not grow opium for cash income because it was against the law. As a result, maize became an important cash crop among the Hmong, which was also supported and encouraged by the Thai government. Maize was grown after the CPT surrendered to the Thai government because the Hmong began to expand the area of maize cultivation into the forest areas that were seized back from the CPT. Maize had been a popular crop for almost 10 years. In 1985 however, maize area cultivation began to decrease because certain areas were reclaimed and announced under protected area status, thus limiting the area to grow maize. In turn, a new cash crop became popular: ginger.

Ginger came to the area because a pickled ginger factory was established in Lom Sak district, Petchabun province. The factory is about 40 kilometer far from Khao Kho. Ginger had become popular because it yielded 5-8 times the profits in comparison with maize, and required less areas for cultivation. This was particularly advantageous because of the loss of cultivable areas re-designated as forest and protected lands. Hmong thereafter received tremendous early success and income from ginger and the Hmong continue to cultivate ginger until today. However, as ginger prefers virgin soil, land also became a concern, especially for the need to incorporate new cultivable lands. For that reason, Hmong have moved further afield into other mountainous districts such as in Phayao, Nan, Chiang Rai and several in Loei province to rent land to grow

ginger. As Hmong dispersed into new regions to cultivate ginger, their reputation as forest destroyers became increasingly common. In news reports Hmong from Kheknoi sub-district, Kho Kho district were arrested by the authorities of the Royal Forestry department for encroaching on forest and protected areas to grow ginger in Nan province (ASTV Manager Online, 2015).



Figure 1. Maize at Khao Kho in 1980 (Fukui Hayao, 2009)

5. Ginger production system in Plaba sub-district

5.1. Land management

In 2015, Ginger was planted in Plaba sub-district and amounted to 3,507 rai with 458 farmers. Productivity is about 2-5 tons per rai. Gingers in Plaba sub-district are produced by small-scale farmers. They grow ginger in about 10-15 rai per household, but they split it into many plots, about 2-3 rai per plot. Farmers noted that if one plot gets infected by fungus and bacteria they still get something from other plots. This is a protection measure so that they will not lose everything.

Due to these land considerations however, ginger farmers every year search further afield to find new land to avoid rot problems. Thus, in order to find new land to grow ginger, farmers rent land in other districts or sub-districts. Farmers express that available land for rent to grow ginger is getting rarer and the price of the land is steadily getting higher. Presently, the price of the land that never grown ginger is about 3,000 – 4,000 baht per rai whereas the land that is used to plant ginger is about 1,000 baht per rai. Currently, some farmers rent land as far as 40-50 kilometers away from their homes to cultivate ginger. One farmer said that although ginger cultivation requires these distances and can be very costly, it is still worth a try because of the potential windfall profits. Some are willing to take the risk.

5.2. Cropping system

Suitable land for ginger cultivation are located on terrain with a slight slope, high altitudes, and clay loam soil. Nevertheless farmers express they cannot be picky about land selection. As it stands, farmers will try to find land that was not previously planted with ginger. However, because of land limitations, farmers also cultivate lands that were previously plant with ginger. The general criteria however, is that the land must have been free from ginger for at least three years. Thus, the ginger growing system in Plaba could be considered as a rotation system, which contrasts with the Hmong systems who do not return to grow ginger on the same land. Farmers also express that after growing ginger (which usually includes upland rice or maize) other crops will get a good yield because of the fertilizer left behind from growing ginger.

Ginger is propagated by planting pieces or portions of rhizomes, which have at least one good bud. Plaba farmers keep the rhizome in the ground (they do not harvest the ginger until they are ready to grow the following crop) from their previous crops to grow for the next crop. Rhizomes are cut into pieces of the required sizes (usually 2.5 to 5 cm length) and are immediately planted.

The ginger farmers start plowing the land allocated for ginger production and planting the rhizomes during March and April depending on rainfall. The rhizomes are planted in one row in beds and use chicken manure as fertilizer on the bottom layer, which is then covered with soil. The spacing between rhizomes is around 15-20 cm. Immediately after planting, beds are covered with mulch, such as grasses of up to 8-10 cm thickness. Mulching protects seedlings from the sun,

prevents weed growth, and keeps soil soft and moist. Chemical fertilizers are applied one month after planting the ginger and again before harvesting to accelerate the growth of rhizomes. The farmers are very careful with the ginger during the 2-3 months after planting because these are the highest risk period for disease. If they can identify the rot in the ginger early on, they will destroy the rotted plants before it infects the entire plot. Ginger can be harvested and sold in three stages, including baby ginger (3-4 months age), mild ginger (4-6 months age) and mature gingers (more than 9 months age), the latter of which is kept to plant for the subsequent crop. Usually baby gingers are harvested in July.

5.3. Marketing channels

The middlemen are local people who live in the area, or come from Lom Sak district, Petchabun province – a distance of about 100 kilometers from Plaba. These middlemen come to farmer homes and buy the product directly. There are 2 types of selling systems, either to sell as the rhizome or directly as land. Selling rhizomes means that farmers harvest the ginger and sell it according to the weight and market price. Selling as land means the farmer sells all the production process to the middlemen.



Figure 2. A ginger farmer in Plaba sub-district, Phu Ruea district, Loei

The middlemen then pay the farmer according to the size of the land and considers the production costs that the middle men predict. This requires the middlemen to organize and conduct the harvest. The farmers usually like to sell their products as land because they can save time and reduce hiring costs for harvesting. The farmers sell the rhizome into 3 types. Firstly, the highest price, the farmers grade the larger rhizomes and clear the skin (no damage to the peel). The second grade consists of the rhizome that is large but which consist of some damages the the peel. The third grade is those of the lowest quality in size and appearance. This type gets the lowest price.

Farmers said they will evaluate their products and then decide what type of rhizome they will sell. If production quality is good, they will sell as the first or second grade. If the quality is poor, they will combine the stock and sell it as the third grade for a lower price. The ginger price fluctuates every day. Farmers will evaluate the price of ginger from the buyer. If the price is acceptable, they will harvest. If the price is unacceptable, they will not harvest the ginger until they can justify an acceptable price. Ginger requires high investment costs, especially among new growers. It requires several thousand baht for initial investment including the cost of the rhizomes, chicken manure, land preparation, and land rent. Moreover, growing the ginger also risks price fluctuations and the potential for rot. Therefore, according to one farmer, it would be difficult for

new growers to enter the market. Ginger also requires high labor inputs but Plaba does not have this problem because migrant labor is readily available from neighboring Laos.

6. Conclusion

The aim of this paper was to begin to reveal some of the broader agricultural dynamics taking place among lesser known rural areas. I have examined ginger as the main economic crop for an ethnic hill tribe, the Hmong, who have long been associated with cultivating ginger and destroying the forest. One community described herein however, has been continuously growing ginger for almost 30 years in the Plaba sub-district by ethnic Tai-Loei, at times with high income potential and without the commonly associated issues of ginger and deforestation. Ginger is a king crop for some of the farmers there, although I have identified challenges associated with unstable ginger prices and challenges in cultivation. That said, although I have begun to expose some of the more perplexing dynamics of the lesser known cultivation histories, markets, and potential for ginger, much of the complexity remains a mystery.

From an agricultural systems perspective, ginger could provide a potential for expansion to other areas that can help to lift rural incomes and improve quality of life. One main challenge however are the risks associated with disease sensitivity. Once a ginger crop is infected, farmers could lose entire yields for that year. Understandably, especially among more vulnerable communities, farmers are unwilling to take this risk. If the disease aspects could be addressed however, there is great potential for expanding this cash crop. One barrier also identified in my research is the perception that ginger continues to act as a forest destroyer. Without a better articulation of the potential for ginger and assurances that it will not impinge on forests there is likely to be little formal interest through government support programs.

Therefore, although this research has scratched the surface of the more mysterious elements of ginger in a particular region, findings indicate that more focused attention and research should be given to the potential diversification of valuable crops such as ginger. In particular, research is needed to explain the potential for ginger production and the practices for implementing such a program. Such research requires various expertise and backgrounds, such as social scientists that can evaluate the broader effects on these upland communities. Furthermore, agricultural systems analysts can help to respond to some of the more volatile market aspects that need to be addressed between producers and middlemen. One approach could be to generate greater understanding about why Plaba farmers have been able to continuously cultivate ginger, especially why some farmers succeeded in growing ginger and why others do not. Plant pathologists or soil scientists could help to find ways to overcome disease threats and reduce risks for farmers. Environmentalists and ecologists could also help to examine the broader environmental interactions between ginger cultivation and the forest in ways that could provide a more nuanced understanding on the agro-forest landscape. If for example, successful ginger cultivation could occur without constant relocation to new landscapes as has occurred in Plaba, there are opportunities to work with government agencies to make cultivation practices more sustainable elsewhere.

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